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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/599,205	09/22/2006	Yuichiro Sasaki	41341	5783

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EXAMINER	
HARRISON, MONICA D	

ART UNIT	PAPER NUMBER
2893	

NOTIFICATION DATE	DELIVERY MODE
07/24/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/599,205	SASAKI ET AL.	
	Examiner	Art Unit	
	Monica D. Harrison	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 September 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *14-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *14-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 September 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/01/06 and 4/22/08*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 14-23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 14, in the phrase “a set of introducing an impurity” (line 3) "a set of" is erroneous. The change to “a step of" would be acceptable, see the specification (p.4, line 17).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 14, 15, 18, 19 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Kub et al (6,555,451).

Regarding claim 14, Kub et al disclose an impurity introducing method which comprising: a set of introducing an impurity selected from a group consisting of B, As, P, Sb and In (Figure 1, reference 16) into a surface of a semiconductor substrate (Figure 1, reference 18);

and a step of radiating inactive plasma to the surface of the semiconductor substrate after the impurity introducing step (column 7, lines 33-49).

Regarding claim 15, Kub et al disclose wherein the step of radiating the plasma includes a step of radiating plasma such that the impurity possesses a desired impurity profile in the semiconductor substrate (column 7, lines 33-49).

Regarding claim 18, Kub et al disclose wherein the step of radiating the plasma includes a step of radiating plasma which contains hydrogen (column 7, lines 33-49).

Regarding claim 19, Kub et al disclose wherein the step of introducing the impurity includes a plasma-doping step (column 7, lines 33-49).

Regarding claim 21, Kub et al disclose wherein the step of introducing the impurity includes a gas-doping step (column 2, lines 36-67 thru column 3, lines 1-4).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kub et al (6,555,451) in view of Nishikawa et al (6,890,605 B2).

Kub et al disclose all above claimed subject matter except wherein the step of radiating the plasma includes a step of radiating plasma which contains at least one kind of rare gas element (claim 16) and wherein the step of radiating the plasma includes a step of radiating He plasma (claim 17).

Nishikawa et al disclose the step of radiating the plasma includes a step of radiating plasma which contains at least one kind of rare gas element (column 3, lines 1-11) and wherein the step of radiating the plasma includes a step of radiating He plasma (column 3, lines 1-11).

It would have been obvious, at the time the invention was made, for one having ordinary skill in the art, to modify Kub et al with the teachings of Nishikawa et al, for the purpose of using rare gas plasma in order to irradiate a substrate. The use of noble gas plasma is well known in the art for irradiating, radiating or illuminating substrates in semiconductors.

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kub et al (6,555,451) in view of Koh et al (US 2005/0250317).

Kub et al disclose the above independently claimed subject matter but fail to disclose the step of introducing the impurity includes an ion-implanting step (claim 20)

Koh et al disclose wherein an ion-implanting step as an alternative for doping, see pg.14, paragraph 0260.

It would have been obvious, at the time the invention was made, for one having ordinary skill in the art, to modify Kub et al with the teachings of Koh et al, for the purpose of introducing impurities using ion implantation as alternative to diffusion or plasma doping because such usage is conventional and an obvious alternative as supported by Koh et al.

Claims 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kub et al (6,555,451) in view of Momose et al (US 2005/0224898 A1).

Kub et al disclose the above independently claimed subject matter however, Kub et al does not disclose the impurity profile in which the impurity concentration at a depth position of 4nm is set to 1/10 or more of the impurity concentration on a surface of the semiconductor

device (claim 22) and the impurity concentration at a depth position of 7nm is set to 1/100 or more of the impurity concentration in the surface of the semiconductor device (claim 23).

Momose et al disclose the impurity profile in which the impurity concentration at a depth position of 4nm is set to 1/10 or more of the impurity concentration on a surface of the semiconductor device (pg.4, paragraph 0086; Figure 2) and the impurity concentration at a depth position of 7nm is set to 1/100 or more of the impurity concentration in the surface of the semiconductor device (pg.4, paragraph 0086; Figure 2).

It would have been obvious, at the time the invention was made, for one having ordinary skill in the art, to have modified Kub et al as suggested by the teachings of Momose et al, for the purpose of selecting the claimed impurity profile in the above invention, namely the claimed concentration versus depth, since such is conventional and obvious as evidenced by Momose et al to obtain source/drain regions of desired doping profile. Additionally, regarding the claimed ranges in question, "where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). Similarly, a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. Titanium Metals Corp. of America v. Banner, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monica D. Harrison whose telephone number is (571)272-1959. The examiner can normally be reached on M-F 7:00am-3:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Monica D. Harrison/
Examiner, Art Unit 2813

/Tuan N. Quach/
Primary Examiner, Art Unit 2826

mdh
July 17, 2008